PARTICLE-VIBRATION COUPLING IN HALO NUCLEI

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We investigate the coupling of single-particle motion and of vibrations in one- and two-neutron halo nuclei. The essential ingredients of our calculations are a standard Woods-Saxon potential and the low-lying vibrations of the systems, calculated in the Random Phase Approximation. In the case of the one-neutron halo nuclei ^{11}Be and ^{10}Li, the particle-vibration coupling renormalizes the energy of the single-particle levels in an essential way, leading to parity inversion of the s- and p- states. In the case of the two-neutron halo nuclei ^{12}Be and ^{11}Li, we show that the exchange of low-lying collective vibrations provides the glue needed to bind the halo neutrons to the core, while the direct interaction between the two neutrons plays a marginal role.

We compare our results with available experimental data, in particular with spectroscopic factors. The agreeement is found to be remarkable, considering the absence of free parameters in our calculation.